Government Polytechnic Bhatapara (C.G)

Department of Mechanical Engineering

Board of study: Mechanical Engineering

Lesson Plan for the Subject: Advance Manufacturing Process

Name of faculty	**Bhushan Kumar Nayak**
Course code: 2037682(037)	**Semester: 6th**
Duration: 16 Weeks	
Teaching Scheme	**Examination Scheme**
Theory: 4 hrs/week	End Semester Exam: **70 Marks**
	End Semester Exam(Lab) : **30 Marks**
Laboratary : 2 hrs/week	Teacher's Assessment (Assignment & Quiz): **30 Marks**
	Teacher's Assessment Lab (Assignment & Quiz): **50 Marks**
Credit: 4	Internal Assessment (CT): **20 Marks**
	Total Marks: 200 Marks

Course Outcomes (CO's)

CO-1:	**Select the non conventional machining process to produce complex machine components.**
CO-2:	**Explain the advancements in casting process.**
CO-3:	**Explain different advanced welding and metal forming processes.**
CO-4:	**Select relevant machining process to produce gears.**
CO-5:	**Apply recent trends in Computer Aided Manufacturing to produce components effectively.**

Unit No. 01: Non Conventional Machining Process

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
1	Need of advance manufacturing, manufacturing trends and challenges, manufacturing aspects. Types of non conventional machining processes and energy source utilized.	27-01-2026, 29-01-2026				
	Working principle, setup, Process parameter Advantages, limitation and application and safe practices of-					
2	Electrical discharge machining (EDM), Plasma arc machining (PAM),	31-01-2026				
3	Wire Electrical discharge machining (WEDM), Electrochemical Machining (ECM),	03-02-2026				
4	Abrasive jet machining (AJM), Ultrasonic Machining (USM),	05-02-2026				

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
5	Electron Beam Machining (EBM), Laser beam machining (Cutting)	07-02-2026				

Unit No. 02: Advancements in Casting Process

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
1	Metal casting basics, Gating and riser design,	10-02-2026				
	Working principle, set up, process parameters, Advantages, limitations and applications of					
2	Evaporative pattern casing process (EPC),	12-02-2026				
3	Centrifugal and pressure die casting,	14-02-2026				
4	Slush casting, Hybrid EPC process,	17-02-2026				
5	Vacuum EPC, Shell Molding Process.	19-02-2026				

Unit No. 03: Advanced Welding and Metal Forming Processes

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
	Working principle, setup, Process parameter Advantages, limitation and application-					
1	Orbital TIG welding, Electron beam welding (EBW),	21-02-2026				
2	Laser beam welding (LBW), ultrasonic welding.	24-02-2026				
3	Industrial adhesive and Adhesive bonding	26-02-2026				
4	Advanced Metal forming- High energy rate forming,	28-02-2026				
5	Electro-magnetic forming, explosive forming,	03-03-2026				
6	Electro- hydraulic forming, Stretch forming, Contour roll forming.	05-03-2026				

Unit No. 04: Gears Production

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
1	Types of gear and Gear manufacturing methods.	07-03-2026				
2	Gear Hobbing- Types and working principle of gear hobbing, Advantages, limitations and application.	10-03-2026				

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
3	Gear Shaping-Gear Shaping by pinion cutter, Gear Shaping by rack cutter, Advantages, limitation and application of both the methods and comparison of gear hobbing and gear shaping.	12-03-2026, 14-03-2026				
4	Gear Finishing methods- Need of gear finishing and different methods of gear finishing like: a) Gear shaving, b) Gear grinding, c) Gear burnishing, d) Gear lapping, e) Gear honing, (f) Gear tooth rounding	17-03-2026, 19-03-2026				
Unit No. 05: Computer Aided Manufacturing						
Lecture No.	**Topics to be covered**	**Planned Date**	**Execution Date**	**Remarks**	**Sign of Faculty**	**Sign of HoD**
1	Additive manufacturing: 3D printing, Rapid prototyping. Construction and working of 3D printer.	24-03-2026				
2	Type and properties of material for 3D printer and Rapid prototyping machine. File format: STL (Stereo Lithography).	28-03-2026				
3	3D printer software: part import, orientation, processing and printing.	02-04-2026				
4	Computer Integrated Manufacturing (CIM): concept, definition, areas covered and benefits.	04-04-2026				
5	Automation-Define, need of automation, high and low cost automation, examples of automations.	07-04-2026,				
6	Types of Automation - Fixed (Hard) automation, programmable automations and Flexible automations (Soft).	09-04-2026				
7	Group Technology- concept, basis for developing part families, part classification and coding with example, concept of cellular manufacturing. Advantages and limitations.	11-04-2026, 16-04-2026				
8	Flexible Manufacturing System (FMS): concept, evaluation, main elements and their functions, layout and its importance, applications.	18-04-2026				
9	Robot: definition, terminology, classification and types	21-04-2026				

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
10	Components of Robot: manipulator, end effectors, actuators, sensors, controller, processor, software and applications.	23-04-2026				

List of Books

S.No.	*Book Title*	*Author*	*Publisher*
1	*Manufacturing Technology*	*R. K. Rajput*	*CBS, 2 edition*
2	*Manufacturing Process*	*Khanna. O.P.*	*Dhanpat Rai and sons, New Delhi*
2	*Production Technology*	*P. C. Sharma*	*S. Chand Publishing*